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ABSTRACT

This paper recommends the use of a computer simulation about trade and tariff negotiations to reinforce and apply principles learned in undergraduate international trade courses and to provide students with an opportunity to use the advanced features of Symphony, a computer spreadsheet. This simulation is a game in which both the class and individuals earn performance points. The simulation highlights positive relationships between increased trade and reduced tariffs and reasons for difficulties in implementing global free trade. The paper describes: (1) the role of negotiation in trade and tariff theory; (2) the bases for negotiation in this simulation; (3) the parameters of the simulation; (4) the simulation's procedures; and (5) the steps in using a macro-based spreadsheet. (JHP)

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GENERAL AGREEMENT ON TARIFF AND TRADE NEGOTIATIONS: A COMPUTER-BASED SIMULATION

by

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Introduction

This simulation of trade and tariff negotiations has two purposes. Its primary purpose is to reinforce and apply principles learned in the undergraduate international trade class. Its secondary purpose is to provide the students, who are mostly economics and business students, with additional experience in applying advanced features of an electronic spreadsheet which in this particular case is Symphony. It is set up as part of a game through which students earn points based on the success of the class as well as on individual performance. By going through the exercise, the students are able to see how trade theories that explain the benefits from increased trade can be put to work by negotiationing tariff reductions. The simulation points out to them why it is often difficult to implement a regime of global free trade.

It also shows the possibilities and usefulness of integrating microcomputer use in the classroom. It illustrates some of the capabilities and uses of a type of software considered important for many of our graduates. The author believes that the use of the microcomputer is not essential to this simulation. A simulation can still be carried out even without computers. But with it, the simulation becomes faster, more creative and more effective as a teaching tool. The basic framework of this spreadsheet simulation can be readily adapted to other courses, topics, and disciplines just as the author has already done in other economics and business courses.

International Trade

A fundamental assumption and conclusion of international trade theory is that primarily because of comparative advantage, countries are better off participating in international trade rather than trying to produce everything on their own. Furthermore, it is costly for a country to try to produce what could be purchased cheaper abroad and that it should instead focus production in those industries where they have the comparative advantage.

Tariffs, because they tend to raise the prices of commodities that consumers pay and that producers receive, tend to distort the allocation and specialization processes. Furthermore it tends to reduce free trade, preventing countries from realizing the full benefits from free trade. But while international trade may benefit nations and the world as a whole, and while each country can potentially gain more than it loses, trade theory also shows that there are winners and losers from trade within specific countries and industries. It is the reality of winners and losers along with the possibility of a net gain for countries around which the negotiations are designed.

The framework used for the simulation is a round of tariff negotiations under the General Agreement on Tariffs and Trade (GATT). GATT was established because of the desire of countries to expand world trade after the second world war at a time when tariff levels were high. While GATT has been successful in lowering average tariffs in the world, the path has not been

easy. The rounds of negotiations have been hampered by the competing interests of countries and competing interests within countries. Ever present is the dilemma of having winners and losers, even though it can be argued that net country and global welfare is increased by lowering tariffs and increasing trade.

The Bases for for Negotiating in the Simulation

The benefits from trade can theoretically be measured by consumer surplus and producer surplus. Hypothetical values for both surpluses are used in the simulation to "keep score" on how the negotiating parties are doing. Consumer surplus is the difference between what a consumer would have been willing to pay for the units of a product he or she is able to consume and what he or she actually paid. Producer surplus, on the other hand is the difference between what the producer receives for what he sells and what he would have been willing to sell them for. By lowering prices and making more units available to the consumer of product X, free trade is said to increase consumer surplus for the country importing product X. The effect of free trade is to lower producer surplus in industry X of the importing country. For the exporting country, the reverse may be true, i.e., free trade may decrease consumer surplus and increase producer surplus in industry X.

Tariffs are assumed to prevent countries from realizing the potential surpluses from trade. While a tariff may benefit the producers in industry Y in country A, the loss to consumers in

the same industry in the same country exceed such benefits. This inherent conflict between producers and consumers then becomes one of the factors for negotiating tariff reductions.

Within a country, specific industries vary in their relative economic importance. Thus, even if a tariff reduction leads to an increase in consumer surplus that is large compared to the decrease in producer surplus in the same industry, it may or may not be very significant to the country as a whole. The varying levels of economic importance of industries is thus another factor in the simulated trade and tariff negotiations.

Because of varying endowments and economic structures, it is also true that different countries or groups of countries will experience varying levels of gains or losses from increased trade across industries. Hence, while trade can be beneficial to all participating countries, the gains from trade are not distributed equally. The uneven results that can follow from a reduction of tariffs across industries is thus another factor to be considered in the simulation.

Parameters of the Simulation

The beginning scenario for the simulation is one of high average tariffs in the world economy. The objective is therefore to lower the average tariff level for the world which in the simulation is assumed to comprise six countries or groups of countries and fifty industries. The matrix is limited in size to keep the worksheet manageable although the size can be altered

with only a few program changes.

As in an ideal situation under GATT, it is assumed that the most favored nation (MFN) principle applies which means that a tariff agreed upon for an industry between two countries is applied to all the other participating countries. This simplifies the simulation because it requires the negotiation of only one tariff level for each industry which would apply to all countries. Thus at the end of the negotiations, the students must submit only one tariff schedule for the entire class.

As described in the previous section, gains from trade are measured as consumer and producer surpluses which are in turn denominated in dollars. To calculate the surpluses resulting from changes in tariffs, each country is assigned a different sequence of cell formulas for the fifty industries embedded in the worksheet. The cell formulas also reflect the varying levels of importance of each industry to a country's economy. These cell formulas may reflect calculations from actual trade data or hypothetical or modified trade data.

By controlling a few variable values, coefficients and exponents, the instructor is able to change the conditions in the opening scenario and the embedded formulas for each country. It is of course recommended that the simulation approximate the "real world" in as much as the students are supposed to tie in the simulation with trade theory, practice and recent events.

To encourage active participation in the negotiations, credit is given to students for achieving two goals, the first of

which must be achieved before credit can be given for achieving the second. The first goal is that the average global tariffs be reduced by 50% (this can be set by the instructor at any level) from the high average tariffs of the opening scenario. This encourages agreement among students towards cutting tariffs. All participating students receive equal credit if they ("the world") achieve the first goal.

The second goal is to increase the combined consumer and producer surplus for each country summed up across all its industries. How much additional credit a student receives depends on how much of a net increase in surplus his/her country receives from the changes in global tariff levels. Therefore students do not necessarily receive equal credit from the second goal.

These combined goals are meant to reinforce the ideas that tariff reductions are desirable because all parties can gain from international trade, that the benefits from trade outweigh specific losses due to trade, but that the benefits from trade are not necessarily distributed equally. It is from this that the dynamics of the class simulation are derived. The students are free to trade off benefits in one industry for larger benefits in other industries. Their common goal is to find an acceptable mix of tariffs that will lead to benefits for all.

Mechanics of the Simulation

The actual negotiations are conducted over two to three

class periods. Prior to the negotiations, each student or group of students is assigned a specific country or group of countries to represent. The following are the six included in the simulation (like other parts of the simulation this list can be readily altered to suit the instructor's needs):

1. JAPAN - An example of an export oriented developed country.
2. EEC - The European Economic Community, a diverse group of developed countries with competing interests within.
3. USA - An example of a diversified developed country with an increasing reliance on trade.
4. NICS - The Newly Industrialized Countries, progressive developing countries highly dependent on trade in various industries.
5. COMM - Developing countries highly dependent on trade in primary commodities such as cocoa, coffee and copper.
6. IS - Developing countries embarked on a development strategy of import substitution.

A few days prior to the negotiations, the students are given diskettes containing the worksheet for their specific country or group of countries. This provides them with an opportunity to study the country they are representing before the actual

negotiations. They are also free to share the information with other groups if they wish. This allows for prior consultations as is done in "real world" negotiations.

At the start of the class negotiations, each group of students is required to give a short oral presentation outlining their position regarding trade and tariffs. The presentation also includes their initial proposals for reducing tariffs. The short presentations not only set the initial tone of the negotiating sessions but also forces the students to work on their strategies prior to coming to class.

Each group is provided with a microcomputer on which to run the simulation. Tariff levels for each industry are entered as they are proposed and the effects on each group are immediately shown once the recalculation key is pressed. In this way, the feedback is instantaneous so that proposals can be readily assessed. Counter-proposals are more readily developed since the calculations are made quickly allowing the participants to be more creative and flexible without the constraint of going through lengthy calculations. The negotiating sessions are broken into fifteen minute segments with breaks in between during which time the groups disperse to reassess their positions. Caucuses are also allowed during the breaks. The instructor is present during the negotiations mainly as an observed, time-keeper and occassional resource person.

The negotiations run for two class periods, although some students request or require three class periods. At the end of

the negotiations, the agreed upon tariff schedule which applies to all countries, can be input into the instructor's master worksheet which then calculates the changes in global tariffs and surpluses for each country.

An assessment session provides the students with an opportunity to give the instructor their views on any aspect of the simulation. The session is also the time when the instructor goes through the mechanics of the Symphony spreadsheet itself so that students learn how the various cells, windows, menus, macros, etc. were created.

The Simulation Worksheet

Because the worksheet was designed with macros, the student needs to go through only a short sequence of menus before the window in which the tariffs are to be entered appears. The steps with brief descriptions that comprise the worksheet are listed below.

1. Load Symphony
2. Load the simulation worksheet which has an auto execute macro that displays a window with an introduction and explanations. The author is able to assume that the students are "computer literate".
3. To start the simulation, the student types \S.
4. The student is asked if he/she wishes to choose a group of countries to represent:

YES

NO (return to the introduction window)

EXIT (exit from Symphony)

5. If YES, the student is asked to select one of the following:

   JAPAN EEC USA NICS COMM IMPSUB

   Selecting one of the above combines the range of cells containing values relevant to the chosen country with the current worksheet.

6. The student is asked if the simulation is

   NEW - all prior proposed tariff changes will be automatically erased or

   OLD - proposed tariffs from a previously saved session will remain in the worksheet

7. A macro will lead to the display of another instruction screen explaining how the proposed tariffs are to be entered, how to recalculate the worksheet, and how to exit.

8. To start entering the new tariffs, the student types \T

9. The screen then appears with split windows. The larger window contains columns for the following:

INDUSTRY NAME

BEGINNING TARIFF — The high tariffs set by the instructor as part of the beginning scenario against which all changes will be measured.

PROPOSED TARIFF — This column contains the only cells which are not protected and this is where the students enter values. The cell entries can be changed any number of times.

ECONOMIC IMPORTANCE of the industry to the country, a value entered by the instructor.

PRODUCER SURPLUS — The value that would result with the proposed tariff factored in the calculations. The cell formulas are pre-set by the instructor.

CHANGE IN P.S. — The percentage change in the value of the producer surplus due to the change in tariff rate.

CONSUMER SURPLUS — Same as with producer surplus.

CHANGE IN C.S. — Same as with producer surplus.

The smaller window contains information on how much average tariffs have been reduced and how much the combined producer and consumer surpluses have changed for this country. These reflect the major objectives of the simulation participants and upon which credit

will be based.

The students may enter as many proposed tariffs as they wish and may change them as often as they like. The F8 key can be pressed at any time to recalculate the worksheet.

10. To exit the student types \E

11. The student may save the tariff changes in the country worksheet? YES or NO

12. The student is asked if he/she wishes to

EXIT Exit Symphony or

SELECT Select another country to represent and continue the simulation.